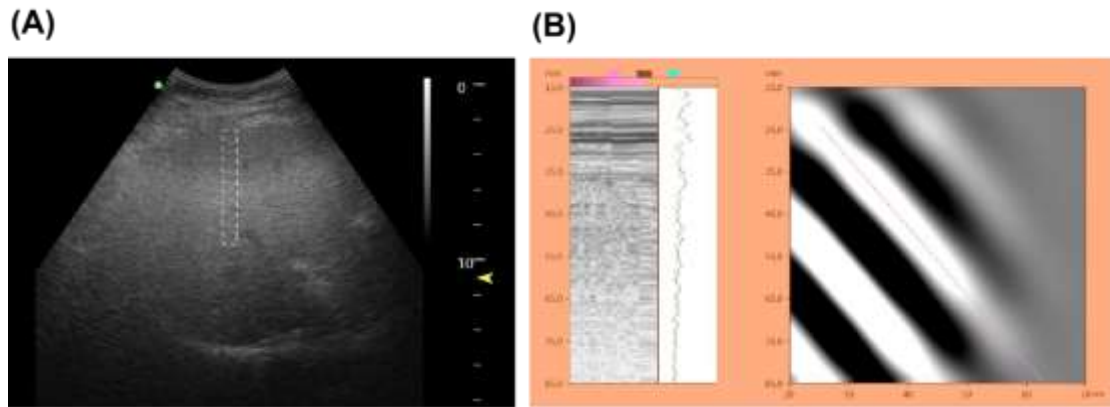




Supplementary Figure 1 Representative VCTE images. A: Liver ultrasound localization; B: UAP signal image (left) and LSM shear wave image (right). VCTE: vibration-controlled transient elastography; UAP: ultrasound attenuation parameter; LSM: liver stiffness measurement.

Supplementary Table 1 Sensitivity Analysis of Short-term Effect of INSTIs on HIV Patients: Consistency of *P*-values before and after Multiple Imputation

Indicator	Effect Type	Original data <i>P</i> value	Multiple imputation <i>P</i> value range	Consistency
UAP, dB/m	Group effect	0.087	0.016-0.305	No
	Time effect	0.8	0.169-0.845	Yes
	Time×Group	0.583	0.242-0.954	Yes
LSM, kPa	Group effect	0.27	0.072-0.444	Yes
	Time effect	0.088	0.004-0.172	No
	Time×Group	0.708	0.639-0.805	Yes
ALT, U/L	Group effect	0.19	0.043-0.238	No
	Time effect	0.587	0.018-0.357	No
	Time×Group	0.999	0.304-0.99	Yes
BMI, kg/m ²	Group effect	0.258	0.184-0.813	Yes
	Time effect	0	0-0.017	Yes
	Time×Group	0.057	0.595-0.922	Yes
HDL, mmol/L	Group effect	0.004	0.001-0.037	Yes
	Time effect	0.323	0.09-0.688	No
	Time×Group	0.979	0.374-0.959	Yes
Glucose, mmol/L	Group effect	0.025	0.001-0.098	Yes
	Time effect	0.056	0.035-0.542	No
	Time×Group	0.357	0.07-0.712	Yes
TyG index	Group effect	0.572	0.329-0.988	Yes
	Time effect	0.029	0-0.027	Yes
	Time×Group	0.057	0.063-0.571	Yes
CD4/CD8 ratio	Group effect	0.452	0.121-0.795	Yes
	Time effect	0.324	0.113-0.751	Yes

		Time×Group	0.322	0.104-0.768	Yes
CD4	cell	Group effect	0.101	0.063-0.222	Yes
count,		Time effect	0.381	0.095-0.422	Yes
cells/μL		Time×Group	0.81	0.271-0.742	Yes

Abbreviation: UAP, ultrasound attenuation parameter; LSM, liver stiffness measurement; ALT, alanine aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; TyG, triglyceride-glucose.

Consistency criteria: If the *p*-value of the original data and the range of *p*-values from multiple imputation are both significant (<0.05) or both not significant (≥0.05), it is determined as "Yes"; otherwise, it is determined as "No".

Supplementary Table 2 Comparison of estimated marginal means (95% CI) for key longitudinal outcomes before and after multiple imputation

Indicator	Group	Time	Original	data	Multiple
			Estimated	mean	imputation
			(95% CI)		Estimated mean (95% CI)
UAP, dB/m	INSTIs	Baseline	237.6	(230.6-	237.6 (230.7- 244.6)
			244.6)		
		Month 6	238.2	(229.6-	238.3 (230.4- 246.3)
	Switch		246.9)		
		Month 12	235.4	(225.3-	237.7 (228.8- 246.7)
			245.5)		
		Baseline	239.0	(228.0-	239.0 (228.1- 249.7)
			250.1)		
		Month 6	242.8	(230.6-	238.9 (224.5- 252.3)
			255.0)		
		Month 12	238.5	(225.9-	234.3 (218.5- 250.1)
			251.0)		

LSM, kPa	non-INSTIs	Baseline	233.2 (226.3- 240.1)	233.2 (226.4- 240.0)
		Month 6	224.5 (215.2- 233.9)	227.5 (214.9- 240.1)
		Month 12	230.2 (221.3- 239.1)	230.4 (220.1- 240.6)
	INSTIs	Baseline	5.41 (4.93- 5.90)	5.41 (4.93- 5.90)
		Month 6	6.08 (5.25- 6.92)	6.16 (5.48- 6.84)
		Month 12	5.84 (5.16- 6.52)	5.92 (4.91- 6.94)
	Switch	Baseline	6.02 (5.26- 6.79)	6.02 (5.26- 6.78)
		Month 6	6.43 (5.23- 7.63)	6.35 (5.20- 7.49)
		Month 12	6.04 (5.13- 6.95)	6.07 (5.19- 6.95)
ALT, U/L	non-INSTIs	Baseline	5.26 (4.78- 5.73)	5.26 (4.78- 5.73)
		Month 6	5.35 (4.41- 6.26)	5.70 (4.87- 6.53)
		Month 12	5.67 (5.06- 6.29)	5.64 (4.83- 6.45)
	INSTIs	Baseline	25.3 (18.99- 31.59)	24.9 (18.39- 31.04)
		Month 6	25.3 (17.90- 32.68)	30.1 (20.27- 39.88)
		Month 12	29.5 (20.47- 38.44)	34.98 (24.22- 45.65)
	Switch	Baseline	27.0 (17.12- 36.98)	28.1 (18.59- 37.65)
		Month 6	26.2 (15.87- 36.56)	27.8 (17.76- 37.64)
		Month 12	29.1 (16.05- 42.11)	31.8 (22.15- 41.53)
BMI, kg/m ²	non-INSTIs	Baseline	32.7 (26.43- 38.90)	33.2 (27.24- 39.20)
		Month 6	32.4 (25.07- 39.56)	35.3 (27.94- 42.59)
		Month 12	35.9 (26.35- 45.40)	37.5 (29.82- 45.28)
	INSTIs	Baseline	21.97 (21.39- 22.56)	21.97 (21.40- 22.55)
		Month 6	22.65 (22.02- 22.56)	22.68 (21.87- 23.50)

			23.28)		
HDL, mmol/L	Switch	Month 12	22.66 (22.02- 23.30)	22.36 (21.55- 23.17)	
		Baseline	21.99 (21.07- 22.90)	21.99 (21.08- 22.89)	
		Month 6	22.59 (21.63- 23.56)	22.71 (21.57- 23.84)	
		Month 12	23.29 (22.36- 24.12)	22.69 (21.78- 23.60)	
		Baseline	21.64 (21.07- 22.13)	21.64 (21.08- 22.07)	
		Month 6	21.90 (21.26- 22.54)	22.33 (21.44- 23.23)	
	non- INSTIs	Month 12	22.10 (21.49- 22.70)	22.22 (21.42- 23.02)	
		Baseline	1.51 (1.33- 1.69)	1.51 (1.32- 1.69)	
		Month 6	1.57 (1.31- 1.84)	1.51 (1.27- 1.75)	
		Month 12	1.47 (1.28- 1.66)	1.46 (1.28- 1.64)	
		Baseline	1.35 (1.06- 1.64)	1.39 (1.11- 1.68)	
		Month 6	1.40 (1.05- 1.74)	1.38 (1.08- 1.69)	
Glucose, mmol/L	non- INSTIs	Month 12	1.16 (0.87- 1.46)	1.25 (0.84- 1.66)	
		Baseline	1.22 (1.04- 1.40)	1.26 (1.09- 1.43)	
		Month 6	1.28 (1.03- 1.54)	1.35 (1.14- 1.56)	
		Month 12	1.16 (0.97- 1.35)	1.24 (1.07- 1.41)	
	INSTIs	Baseline	5.15 (4.76- 5.53)	5.19 (4.84- 5.53)	
		Month 6	5.28 (5.11- 5.44)	5.33 (5.05- 5.61)	

TyG index	Switch	Month 12	4.99 (4.74- 5.25)	5.06 (4.70- 5.42)
		Baseline	5.80 (5.20- 6.39)	5.86 (5.31- 6.42)
		Month 6	5.45 (5.23- 5.68)	5.48 (5.17- 5.78)
		Month 12	5.19 (4.80- 5.58)	5.34 (4.92- 5.76)
	non-INSTIs	Baseline	5.55 (5.17- 5.92)	5.55 (5.21- 5.89)
		Month 6	5.51 (5.35- 5.67)	5.47 (5.22- 5.71)
		Month 12	5.48 (5.21- 5.75)	5.46 (5.13- 5.79)
		Baseline	7.08 (6.86- 7.30)	7.10 (6.88- 7.32)
	INSTIs	Month 6	7.38 (7.15- 7.61)	7.30 (7.11- 7.49)
		Month 12	6.89 (6.65- 7.13)	6.94 (6.70- 7.17)
		Baseline	7.24 (6.89- 7.60)	7.25 (6.90- 7.60)
		Month 6	6.99 (6.68- 7.31)	7.04 (6.75- 7.33)
	Switch	Month 12	6.76 (6.41- 7.10)	6.82 (6.47- 7.17)
		Baseline	7.21 (7.00- 7.42)	7.17 (6.97- 7.38)
		Month 6	7.11 (6.87- 7.36)	7.20 (6.93- 7.46)
		Month 12	7.11 (6.84- 7.37)	7.00 (6.74- 7.26)
CD4/CD8 ratio	INSTIs	Baseline	0.77 (0.66- 0.89)	0.77 (0.66- 0.89)
		Month 6	0.81 (0.69- 0.92)	0.84 (0.69- 1.00)
		Month 12	0.83 (0.71- 0.95)	0.88 (0.75- 1.01)
		Baseline	0.94 (0.76- 1.11)	0.97 (0.79- 1.15)
	Switch	Month 6	0.92 (0.75- 1.09)	0.97 (0.80- 1.14)
		Month 12	0.94 (0.75- 1.12)	0.89 (0.64- 1.15)
		Baseline	0.84 (0.73- 0.95)	0.87 (0.75- 0.98)
		Month 6	0.82 (0.71- 0.93)	0.87 (0.76- 0.98)
	non-INSTIs	Month 12	0.87 (0.75- 0.99)	0.91 (0.74- 1.08)

CD4 cell count, cells/μL	INSTIs	Baseline	527.4 (462.7- 592.0)	520.3 (454.0- 586.6)
		Month 6	568.3 (498.9- 638.4)	582.3 (495.8- 668.9)
		Month 12	542.8 (473.3- 612.3)	539.6 (461.2- 618.1)
	Switch	Baseline	648.9 (548.2- 749.6)	640.3 (530.9- 749.7)
		Month 6	655.2 (551.5- 758.9)	644.2 (533.7- 754.6)
		Month 12	635.1 (530.4- 739.8)	580.5 (462.9- 698.0)
	non-INSTIs	Baseline	527.2 (464.5- 589.9)	539.3 (475.9- 602.7)
		Month 6	538.4 (469.6- 607.1)	548.3 (482.1- 614.5)
		Month 12	514.0 (443.7- 584.3)	518.9 (444.7- 593.0)

Abbreviation: CI, confidence interval; UAP, ultrasound attenuation parameter; LSM, liver stiffness measurement; ALT, alanine aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; TyG, triglyceride-glucose.

INSTIs: INSTIs-based regime group; Switch: switching-to-INSTIs-based regime groups; non-INSTIs: non-INSTIs-based regime group.

Supplementary Table 3 Baseline characteristics of non-obese PLWH with complete versus incomplete UAP and LSM data at all three time points (0, 6, and 12 months)

Variables	Incomplete data (<i>n</i> =	complete data (<i>n</i> = 45)	<i>P</i>
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	70)		value
Age, years	39 (35-46)	38 (33-47)	0.49
Gender [<i>n</i> (%)]			
Male	67 (95.7)	44 (97.8)	0.56
Female	3 (4.3)	1 (2.2)	
Weight, kg ^a	68.0 (60.0-71.0)	68.0 (60.5-73.5)	0.56
BMI, kg/m ^{2a}	22.2 (20.5-23.4)	22.5 (20.3-23.7)	0.60
ALT, U/L	23.0 (17.0-32.5)	22.5 (16.0-32.3)	0.71
Glucose, mmol/L	5.4 (5.1-5.5)	5.2 (4.8-5.5)	0.11
UA, μmol/L ^a	345.9±78.3	370.6±87.5	0.14
LDL, mmol/L ^a	2.9±0.72	2.8±0.7	0.39
HDL, mmol/L	1.2 (1.1-1.4)	1.2 (1.1-1.4)	0.60
TG, mmol/L	1.3 (1.0-2.1)	1.1 (0.8-2.0)	0.41
TC, mmol/L	4.7 (4.2-5.4)	4.5 (3.8-5.3)	0.20
TyG index	7.1 (6.8-7.6)	6.9 (6.6-7.7)	0.39
TC/HDL ^a	3.9±1.2	3.6±1.7	0.28
UAP, dB/m ^a	234.5±24.3	238.3±24.2	0.41
LSM, kPa	5.0 (4.4-5.9)	5.2 (4.4-6.3)	0.50
Duration, months ^a	74.1±33.4	70.9±29.9	0.59
Initial HVL, copies/mL	56513.5 (26245.5-185634.5)	30513.0 (13022.5-62580.8)	<0.01
Initial CD4 cell count, cells/μL ^a	273.3±180.2	268.2±147.0	0.88
CD4 cell count, cells/μL ^a	542.0±234.9	557.2±203.6	0.73
CD4 cell count≥300			0.34

cells/ μ L [n (%)]			
No	23 (32.9)	11 (24.4)	
Yes	47 (67.1)	34 (75.6)	
CD4/CD8 ratio ^a	0.9 $\pm$ 0.4	0.8 $\pm$ 0.4	0.23
Group [n (%)]			<0.001
INSTIs	13 (18.6)	34 (75.6)	
Switch	8 (11.4)	11 (24.4)	
Non-INSTIs	49 (70.0)	0 (0.0)	
Drinking [n (%)]			0.65
No	68 (97.1)	43 (95.6)	
Yes	2 (2.9)	2 (4.4)	
Smoking [n (%)]			0.42
No	69 (98.6)	45 (100.0)	
Yes	1 (1.4)	0 (0.0)	
Hypertension [n (%)]			0.65
No	64 (91.4)	40 (88.9)	
Yes	6 (8.6)	5 (11.1)	
Diabetes [n (%)]			0.75
No	69 (98.6)	44 (97.8)	
Yes	1 (1.4)	1 (2.2)	
Lipid lowering drug [n (%)]			0.31
No	67 (95.7)	41 (91.1)	
Yes	3 (4.3)	4 (8.9)	
Antihypertensive drug [n (%)]			0.31
No	67 (95.7)	41 (91.1)	
Yes	3 (4.3)	4 (8.9)	

Hypoglycemic drug [<i>n</i> (%)]		0.75
No	69 (98.6)	44 (97.8)
Yes	1 (1.4)	1 (2.2)

Abbreviation: BMI, body mass index; ALT, alanine aminotransferase; UA, uric acid; LDL, low-density lipoprotein; HDL, high-density lipoprotein; TG, triglycerides; TC, total cholesterol; LSM, liver stiffness measurement; SD, standard deviation; IQR, interquartile range.

Values are reported as Median (IQR) or count (%) unless otherwise specified.

^a Values are presented as mean $\pm$ SD.

Due to rounding, percentages may not add up to 100%.

Supplementary Table 4 Baseline characteristics of non-obese PLWH with complete versus incomplete 12-month follow-up (baseline and 12-month UAP and LSM data available)

Variables	Not completed (<i>n</i> = 51)	Completed 12-month follow-up (<i>n</i> = 64)	<i>P</i> value
Age, years	41 (36-47)	38 (33-46)	0.29
Gender [<i>n</i> (%)]			
Male	50 (98.0)	61 (95.3)	0.43
Female	1 (2.0)	3 (4.7)	
Weight, kg	68.0 (60.0-71.0)	67.5 (60.0-72.0)	0.84
BMI, kg/m ²	22.0 (20.6-23.2)	22.6 (20.3-23.7)	0.38
ALT, U/L	25.0 (18.0-34.0)	22.0 (16.0-29.3)	0.12
Glucose, mmol/L	5.4 (5.1-5.7)	5.2 (4.9-5.5)	0.11
UA, μ mol/L ^a	339.1 $\pm$ 80.4	369.1 $\pm$ 82.6	0.07
LDL, mmol/L ^a	2.9 $\pm$ 0.7	2.8 $\pm$ 0.7	0.37
HDL, mmol/L	1.2 (1.0-1.3)	1.2 (1.1-1.5)	0.11

TG, mmol/L	1.5 (1.0-2.1)	1.2 (0.9-1.9)	0.24
TC, mmol/L	4.9 (4.2-5.4)	4.5 (4.0-5.3)	0.10
TyG index	7.3 (6.8-7.6)	6.9 (6.6-7.5)	0.16
TC/HDL	4.1 (3.4-4.8)	3.5 (2.9-4.0)	<0.01
UAP, dB/m ^a	234.5±24.42	237.2±24.1	0.56
LSM, kPa	4.9 (4.4-5.7)	5.2 (4.4-6.2)	0.25
Duration, months ^a	75.0±35.48	71.1±29.1	0.53
Initial HVL, copies/mL	48265.5 (26190.5-186315.5)	34488.5 (15548.0-99627.8)	0.19
Initial CD4 cell count, cells/μL	298.0 (131.5-388.8)	257.0 (139.0-383.0)	0.66
CD4 cell count, cells/μL ^a	537.0±222.6	557.1±222.7	0.65
CD4 cell count≥300 cells/μL [<i>n</i> (%)]			0.97
No	15 (29.4)	19 (29.7)	
Yes	36 (70.6)	45 (70.3)	
CD4/CD8 ratio	0.84 (0.6-1.2)	0.73 (0.5-1.0)	0.45
Group [<i>n</i> (%)]			<0.001
INSTIs	0 (0.0)	47 (73.4)	
Switch	2 (3.9)	17 (26.6)	
Non-INSTIs	49 (96.1)	0 (0.00)	
Drinking [<i>n</i> (%)]			0.43
No	50 (98.0)	61 (95.3)	
Yes	1 (2.0)	3 (4.7)	
Smoking [<i>n</i> (%)]			0.26
No	50 (98.0)	64 (100.0)	
Yes	1 (2.0)	0 (0.0)	

Hypertension [n (%)]			0.94
No	46 (90.2)	58 (90.6)	
Yes	5 (9.8)	6 (9.4)	
Diabetes [n (%)]			0.87
No	50 (98.0)	63 (98.4)	
Yes	1 (2.0)	1 (1.6)	
Lipid lowering drug [n (%)]			0.94
No	48 (94.1)	60 (93.8)	
Yes	3 (5.9)	4 (6.3)	
Antihypertensive drug [n (%)]			0.39
No	49 (96.1)	59 (92.2)	
Yes	2 (3.9)	5 (7.8)	
Hypoglycemic drug [n (%)]			0.87
No	50 (98.0)	63 (98.4)	
Yes	1 (2.0)	1 (1.6)	

Abbreviation: BMI, body mass index; ALT, alanine aminotransferase; UA, uric acid; LDL, low-density lipoprotein; HDL, high-density lipoprotein; TG, triglycerides; TC, total cholesterol; LSM, liver stiffness measurement; SD, standard deviation; IQR, interquartile range.

Values are reported as Median (IQR) or count (%) unless otherwise specified.

^a Values are presented as mean $\pm$ SD.

Due to rounding, percentages may not add up to 100%.